Association of polybrominated diphenyl ether (PBDE) levels with biomarkers of placental development and disease during mid-gestation.

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Public Summary:
Polybrominated diphenyl ether (PBDE) exposures have been associated with adverse pregnancy outcomes. A hypothesized mechanism is via alterations in placental development and function. However, we lack biomarkers that can be used as early indicators of maternal/fetal response to PBDE exposures and/or perturbations in placental development or function.

Scientific Abstract:
BACKGROUND: Polybrominated diphenyl ether (PBDE) exposures have been associated with adverse pregnancy outcomes. A hypothesized mechanism is via alterations in placental development and function. However, we lack biomarkers that can be used as early indicators of maternal/fetal response to PBDE exposures and/or perturbations in placental development or function. METHODS: To evaluate the relationship between PBDE levels and placental biomarkers during mid-gestation of human pregnancy (n = 62), we immunolocalized three molecules that play key roles in cytotrophoblast (CTB) differentiation and interstitial/endovascular uterine invasion-integrin alpha-1 (ITGA1), vascular endothelial-cadherin (CDH5), and metalloproteinase-1 (MMP1)-and assessed three morphological parameters as potential indicators of pathological alterations using H&E-stained tissues-leukocyte infiltration, fibrinoid deposition, and CTB endovascular invasion. We evaluated associations between placental PBDE levels and of biomarkers of placental development and disease using censored Kendall's tau correlation and linear regression methods. RESULTS: PBDEs were detected in all placental samples. We observed substantial variation in antigen expression and morphological endpoints across placental regions. We observed an association between PBDE concentrations and immunoreactivity of endovascular CTB staining with anti-ITGA1 (inverse) or interstitial CTBs staining with anti-CDH5 (positive). CONCLUSIONS: We found several molecular markers that may be sensitive placental indicators of PBDE exposure. Further, this indicates that placental biomarkers of development and disease could be useful barometers of exposure to PBDEs, a paradigm that could be extended to other environmental chemicals and placental stage-specific antigens.